02280.003530.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: V. F. Faison Gee
ARUN V. SHASTRY, ET AL.	)	
	:	Group Art Unit: 1793
Application No.: 10/606,417	)	
	:	
Filed: June 26, 2003	)	
	:	
For: EDIBLE INKS FOR INK-JET PRINTING ON EDIBLE SUBSTRATES	)	

Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION UNDER 37 C.F.R. § 1.132
OF ARUN V. SHASTRY

ARUN V. SHASTRY, declares and says that:

I. Personal Background

1. I am employed by Mars, Incorporated, as a Science and Technology Manager in the Department of Research and Development.

2. I have been employed at Mars Incorporated for over 14 years, and have worked in numerous projects related to new technology development and product innovation. My educational background includes a Bachelors degree in Chemical Engineering, a Masters degree in Food Engineering and a Doctoral degree in Food Engineering (with a minor in Pharmaceutical Sciences), all received from University of Wisconsin-Madison.

II. Background of the Application

3. I am the first named inventor on the above captioned application.

4. I am familiar with the above-captioned application, and with the Office Action dated September 18, 2008 ("the Office Action").

5. I make this Declaration in support of a response to the Examiner's position set forth in the Office Action in which all of the pending claims of the application have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable in view of U.S. Patent Application Publication No. 2003/0101902 ("Reitnauer), U.S. Patent No. 6,450,615 ("Kojima"), and U.S. Patent No. 5,464,470 ("Brachman").

6. Specifically, this Declaration is intended to show that Reitnauer, Brachman, and Kojima, taken together or separately, do not teach the use of a fat or wax dispersible carrier to solubilize an FD&C dye.

7. Further, this Declaration is intended to show that the use of glycerin and/or propylene glycol as an "oil, flexibilizer or plasticizer," as outlined in Reitnauer, would not inherently dissolve an FD&C dye in a fat or wax-based ink composition or disperse the dye in the fat or wax base.

III. Background of the Invention

8. By way of background, the invention described in the claims of the above-captioned application came about as a result of intensive effort on my part, and on the part of others, to develop edible inks for high resolution printing on edibles, and especially on sugar shell candy, such as M&M's® Peanut and Chocolate Candies.

9. High resolution printing is defined in the above-captioned application as printing that obtains a printed resolution of greater than 100 dpi (see

paragraph [0054]). In specific examples provided in the specification, a resolution of about 300 dpi or greater is achieved with a piezojet print head. (See paragraph [0054] and claim 17, for example.)

10. The print heads that enable high resolution printing have smaller ejection orifices than print heads used for low resolution printing and, in particular, higher resolution piezojet print heads, used extensively in connection with the present application, have smaller ejection orifices than the ink-jet print head described in Reitnauer.

11. In particular, I am familiar with the Markem 9096 printer, which is the printer described in Reitnauer (Reitnauer, paragraph [0033]). I know this to be a low resolution (*i.e.*, less than 100 dpi) printer.

12. Constraints that apply to a formulation of fat or wax-based ink for a high resolution piezojet printhead, would not apply to a Markem 9096 printer, due at least in part to the respective size of the ejection orifices. Thus, a formulation of fat or wax-based ink suitable for use with the 9096 printer may not be, and in all likelihood would not be, acceptable for use in a high resolution piezojet print head.

IV. Observations Pertinent to the Reitnauer Reference

13. I note that the viscosity of the ink described in Reitnauer is 22.4 centipoise. This viscosity would render an ink either inoperable or significantly sub-optimal for use in a high resolution piezojet print head, which typically requires an ink having viscosity in the range of about 5 to about 20 centipoise, which is the range claimed in Claim 7 of the above-captioned application.

14. I have reviewed the Reitnauer reference, and I do not consider it to disclose the use of glycerin and/or propylene glycol as a solvent(s) for an FD&C dye. To

the contrary, the disclosure relating to glycerin in Reitnauer is limited to paragraphs [0030] to [0031], wherein glycerin is mentioned as one of many ingredients that may be used in a wax-based ink as an oil, flexibilizer or plasticizer.

15. I do not consider Reitnauer to disclose dispersing an FD&C dye in a fat or wax base.

16. The Apocarotenal dispersion described in Reitnauer Example 1 through Example 4, and described in paragraph [0026] as a "preferred colorant," is not a FD&C dye and, moreover, would be soluble in oil and dispersible in wax, so that it would not be necessary to solubilize this colorant with glycerin or propylene glycol to disperse it in a fat or wax base.

17. The lakes mentioned as potential colorants in Reitnauer, paragraph [0026], including FD&C Green no. 3, aluminum lake; FD&C Green no. 3, calcium lake; FD&C Blue no. 1, aluminum lake; FD&C Blue no. 2, aluminum lake; FD&C Blue no. 1, calcium lake; FD&C Blue no. 2, calcium lake; FD&C Red no. 40, calcium lake; FD&C Yellow no. 5, aluminum lake; FD&C Yellow no. 5, calcium lake; FD&C Yellow no. 6, aluminum lake; FD&C Yellow no. 6, calcium lake; iron oxide; titanium dioxide; erythrosine lake; amaranth lake; Ponceau 4R lake; and carmoisine lake, contain an insoluble pigment colorant, which is insoluble by definition. Of course, one of ordinary skill in the art would not look to solubilize insoluble particles with glycerin and/or propylene glycol.

18. Of the remaining dyes that are mentioned in Reitnauer at paragraph [0026], which are water-soluble, it would pose a technical challenge to ensure that the dyes became both solubilized and dispersible directly in a fat or wax base.

19. In preparing the inks according to the invention, we dissolved or dispersed the colorant in a carrier first. See paragraph [0033] of the specification (paragraph [0036] of the published application). Thereafter, we were able to obtain a dispersion of the colorant system (dye-plus-carrier) in the fat or wax phase. As demonstrated by the experiment described below (Experimental Section V), providing an amount of glycerin by itself does not ensure that the glycerin is a "carrier" of the colorant in a fat or wax-based ink composition.

20. The use of glycerin and/or propylene glycol in normal amounts as a flexibilizer or plasticizer would not inherently solubilize and disperse a water-soluble dye in a fat or wax base. By definition, a flexibilizer or plasticizer functionally modifies the firmness or stiffness of polymeric materials and therefore need not require solubilization of all components in the polymeric matrix.

V. Experimental Section

21. To demonstrate that a water-soluble FD&C dye would neither be adequately solubilized nor adequately dispersed in a glycerin flexibilizer or plasticizer according to Reitnauer, the following experiment was performed under my direction and control.

23. Four compositions were made as follows: Composition A consisted of 2 grams of FD&C Dye Blue No. 1 in 398 grams of melted cocoa butter; Composition B consisted of 2 grams of FD&C Dye Blue No. 1, 12 grams of glycerin, and 386 grams of melted cocoa butter; Composition C consisted of 14 grams of a mixture of FD&C Dye Blue No. 1 in a glycerin carrier, prepared according to the attached Experimental Protocol

1 (Exh. 1), in 386 grams of melted cocoa butter; and Composition D consisted of 20 grams of the colorant mixture of Experimental Protocol 1 in 380 grams of cocoa butter.

24. Cocoa butter was used because it mimics the behavior of carnauba wax, but is safer to work with due to its lower melting temperature. Compositions B, C and D utilized at least 12 grams of glycerin to determine the effect of a 3 wt% addition of glycerin.

25. Composition A reflects what would happen if one simply added FD&C dye to a fat or wax base. The colorant does not disperse well at all in the fat or wax base.

25. Composition B, reflects the order of addition of Reitnauer, in that colorant is added to a mixture of the base ingredients (now including glycerin). This example shows that water-soluble FD&C dye colorant will not simply solubilize in the available glycerin and disperse into a fat or wax base, even if 3 wt% glycerin is provided to the base. On performing the experiment, the lab technician noted that "Powder color does not mix easily into the cocoa butter. It tends to stay on the surface."

26. Composition C has 14 grams of a glycerin/dye mixture, about the same amount of glycerin as provided in Composition B, except that the glycerin is provided as a carrier for the colorant, as required in the present claims. With respect to Composition C, the lab technician reported that the dispersion mixes rapidly into the cocoa butter.

27. Adding more of the dispersed colorant/carrier mixture to the fat or wax base according to Composition D, resulted in a more intense color.

28. The compositions were remelted to a liquid state and photographed. Exhibit 2 is a photograph of Composition A (labeled "I") side by side with Composition B (labeled "II"); Exhibit 3 is a photograph of Composition C (labeled "III") side by side with Composition D (labeled "IV").

29. As may be ascertained by comparing Composition B with Composition C, simply adding dye and glycerin to the fat or wax base, without first dispersing the dye in the glycerin, as in Composition B, does not result in the dye dissolving in the glycerin or properly dispersing into the fat or wax base. To the contrary, in Exhibit 2, the dye is seen to precipitate from the fat or wax base of Composition B.

30. To perform colorimeter testing, Compositions A through D were melted to 50 deg C and transferred to a 10 mm glass cell. The samples were tested with a Minolta 3500d-CM Colorimeter in transmittance mode. The transmittance spectra plot is shown at Exhibit 4 (percent transmittance at varying wavelengths (in nm), where 450 - 495 nm is the approximate blue wavelength range). It is evident from the plot that Compositions C and D transmitted significantly more light in the 450-495 nm range than either A or B, indicating a greater amount of dye dissolved in these samples compared to the Compositions A and B.

31. From these observations, I conclude that there is insufficient information in Reitnauer, taken together with the ingenuity of the ordinary artisan at the time of the present invention, that would enable the use of glycerin and/or propylene glycol to (a) solubilize a water-soluble FD&C dye, or (b) disperse the dye in a fat or wax base, and that such result is not inherent in the use of glycerin in an amount of 3% by weight in a fat or wax based ink.

VI. Observations Pertinent to Brachman

32. I understand the Office Action at pages 3 to 4 to suggest that Brachman teaches that FD&C dye present in an amount of 0.1 percent by weight to about 5.0 percent by weight is solubilized in 0.5 percent by weight to 3 percent by weight glycerin. I do not consider Brachman to teach this.

33. Brachman distinguishes water and alcohol soluble dyes at column 6, lines 18-27.

34. All of the compositions described in Table 1 of Brachman contain approximately the same amount of glycerol (glycerol is a synonym for glycerin). Only four of these compositions do not contain water. In these water-free examples, an alcohol soluble dye is used. For the examples using water soluble dyes, Brachman describes water being present in the solvent system. Therefore, I conclude that Brachman does not teach the use of glycerin alone as a solvent for water-soluble dyes such as FD&C dyes.

35. Furthermore, although Brachman discloses FD&C dyes in the specification, none of the Examples in Table 1 includes an FD&C dye.

36. From these observations I conclude that Brachman does not teach that glycerin solubilizes a water-soluble FD&C dye for the purposes of dispersing the same in a fat or wax base.

VII. Observations Pertinent to Kojima

37. I understand that Kojima is cited as being relevant to the art of high resolution piezojet ink-jet printheads. However, I do not consider Kojima to be relevant in the present context because it does not relate to the use of edible inks specifically or to the solubilization and dispersion of a water-soluble dyes in a fat or wax base. Insofar as the

general requirements for an ink to be compatible with a piezojet printhead are relevant, these are known to those of ordinary skill, and made of record in the Background of the Invention section of the present specification.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Subscribed this 17th day of March, 2009

Arun Shastry

Arun V. Shastry

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EXHIBIT 1

Experimental Protocol 1

A. Preparation of Glycerol-FD&C Blue No. 1 dispersion
NOTE: PREPARATION TIME = 2 Days

a. Weigh 497.5 grams of glycerol

b. Add 2.5 grams of FD&C colorant to the glycerol

c. Mix the dispersion on a magnegic stirrer plate and mix with magnetic stirrer for 2 days

I. Composition A

1. Melt cocoa butter completely and hold at above 40 °C (so that the fat is fully melted)

2. Weigh 398g melted cocoa butter

3. Blend the melted cocoa butter on Silverson mixer till it is well dispersed.

4. Gradually add 2 grams of FD&C Blue No. 1 to the mixing cocoa butter

5. Continue mixing for 1 minute to ensure complete mixing of colorant into cocoa butter.

6. Save sample in container for colorimeter measurement.

II. Composition B

1. Melt cocoa butter completely and hold at above 40 °C (so that the fat is fully melted)

2. Weigh 386g melted cocoa butter

3. Blend the melted cocoa butter on Silverson mixer till it is well dispersed.

4. Gradually add 12 grams of glycerol to melted cocoa butter and mix for 1 minute at high speed

5. Add 2 grams of FD&C Blue No. 1 to the mixing cocoa butter and glycerol

6. Continue mixing for 1 minute to ensure complete mixing of colorant into cocoa butter.

7. Save sample in container for colorimeter measurement.

III. Composition C

1. Melt cocoa butter completely and hold at above 40C (so that the fat is fully melted)
2. Weigh 386g melted cocoa butter
3. Blend the melted cocoa butter on Silverson mixer till it is well dispersed.
4. Gradually add 14 grams of (FD&C Dye Blue No. 1 and glycerine dispersion) to melted cocoa butter and mix for 1 minute at high speed
5. Continue mixing for 1 minute to ensure complete mixing of colorant into cocoa butter.
6. Save sample in container for colorimeter measurement.

IV. Composition D

1. Melt cocoa butter completely and hold at above 40C (so that the fat is fully melted)
2. Weigh 380g melted cocoa butter
3. Blend the melted cocoa butter on Silverson mixer till it is well dispersed.
4. Gradually add 20 grams of (FD&C Dye Blue No. 1 and glycerine dispersion) to melted cocoa butter and mix for 1 minute at high speed
5. Continue mixing for 1 minute to ensure complete mixing of colorant into cocoa butter.
6. Save sample in container for colorimeter measurement.

EXHIBIT 2

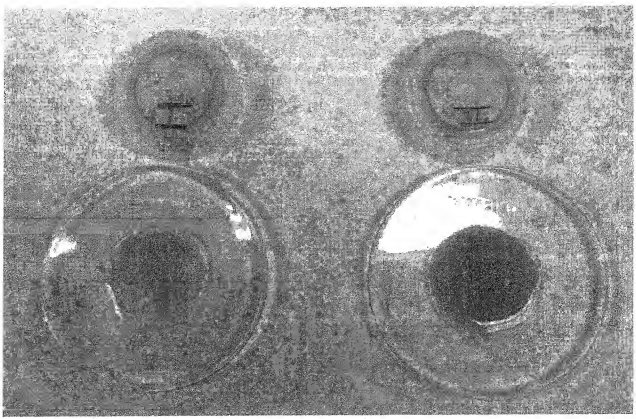


EXHIBIT 3

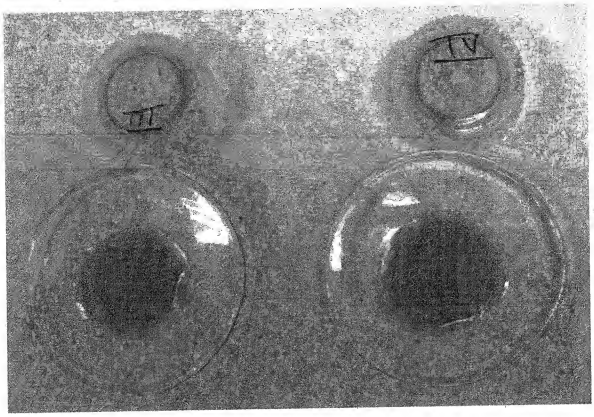
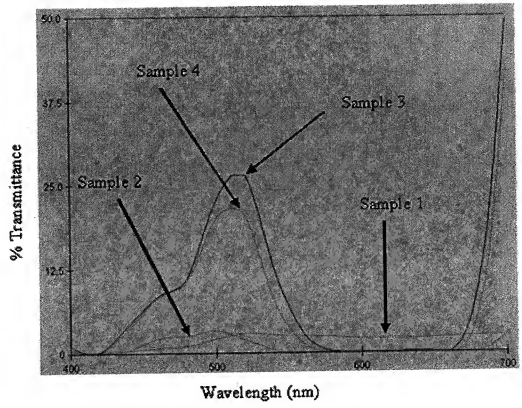


Exhibit 4


50.0
37.5
25.0
12.5
0
% Transmittance
Sample 4
Sample 3
Sample 2
Sample 1
400
500
600
700
Wavelength (nm)